



— BUREAU OF —  
RECLAMATION

# **Klamath Project DRAFT Temporary Operations Procedure**

**January 06, 2022**

# Presentation Outline

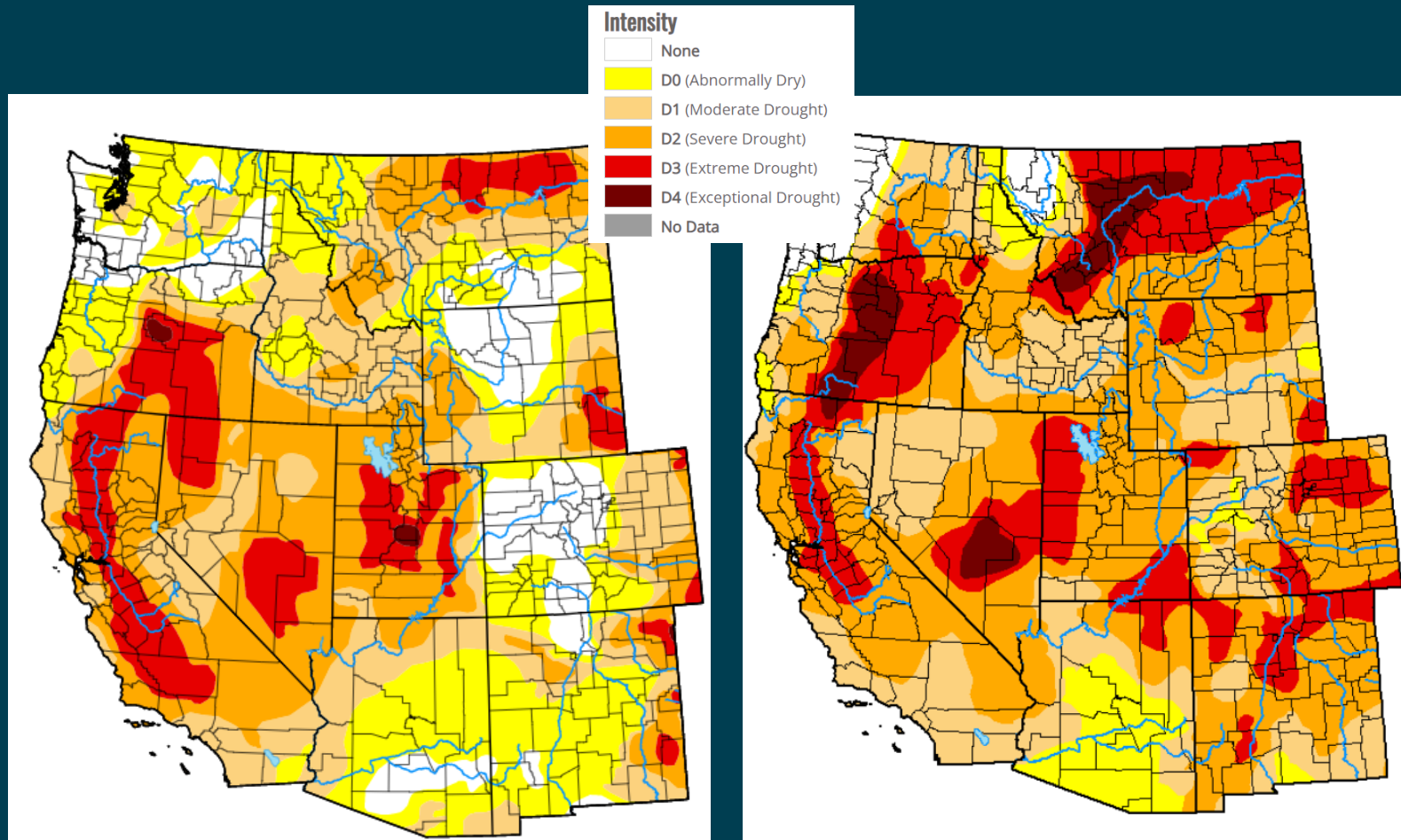
- **Monitoring Information**
- **Current Forecasts and Reclamation Interpretation**
- **Proposed Temporary Operating Procedures**
- **Proposed Schedule for Input and Action**
- **Supplemental Information (not for presentation)**



# Meteorological Monitoring & Forecasts



# United States Drought Monitor – West Region

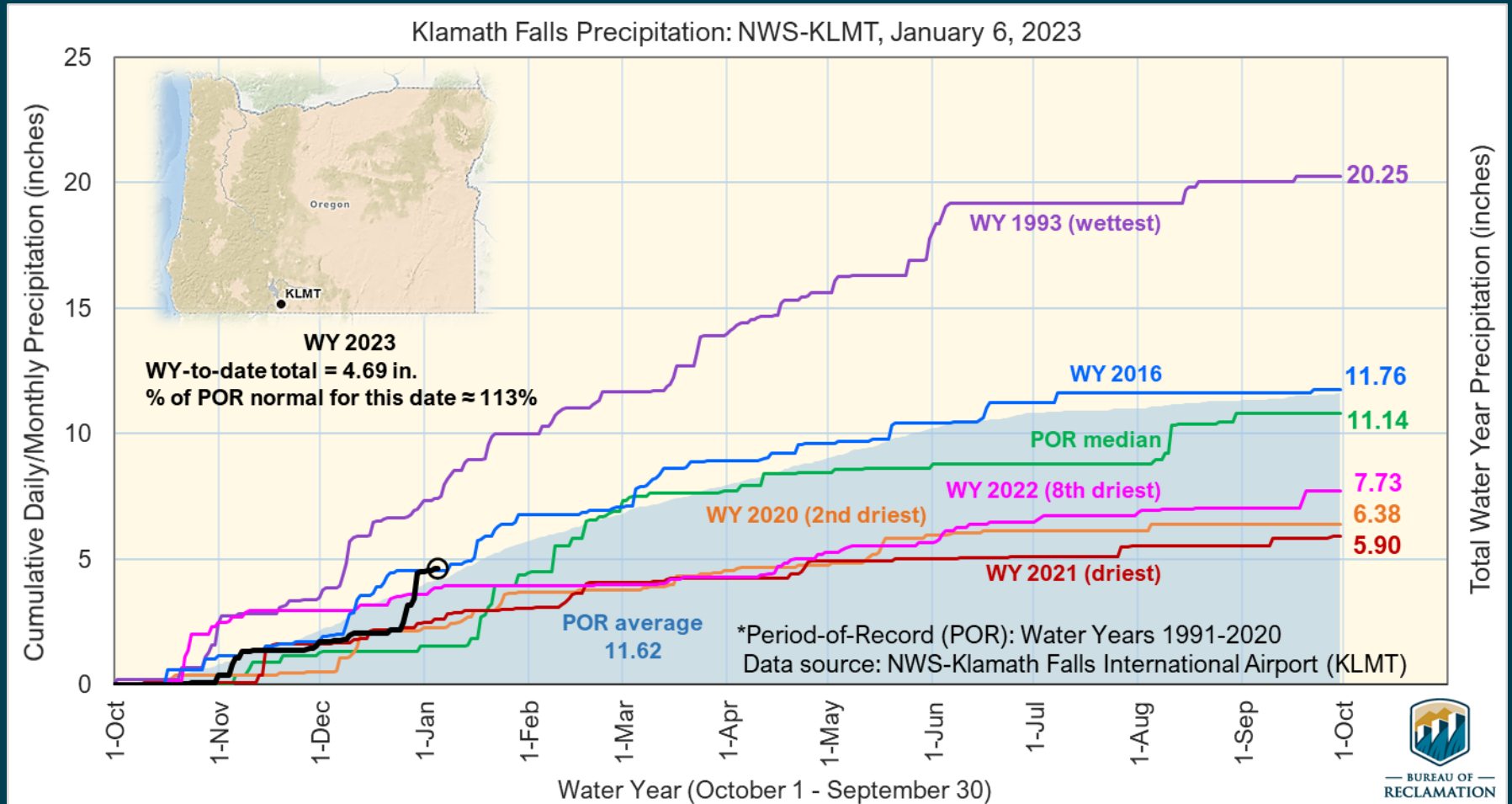


January 5, 2023

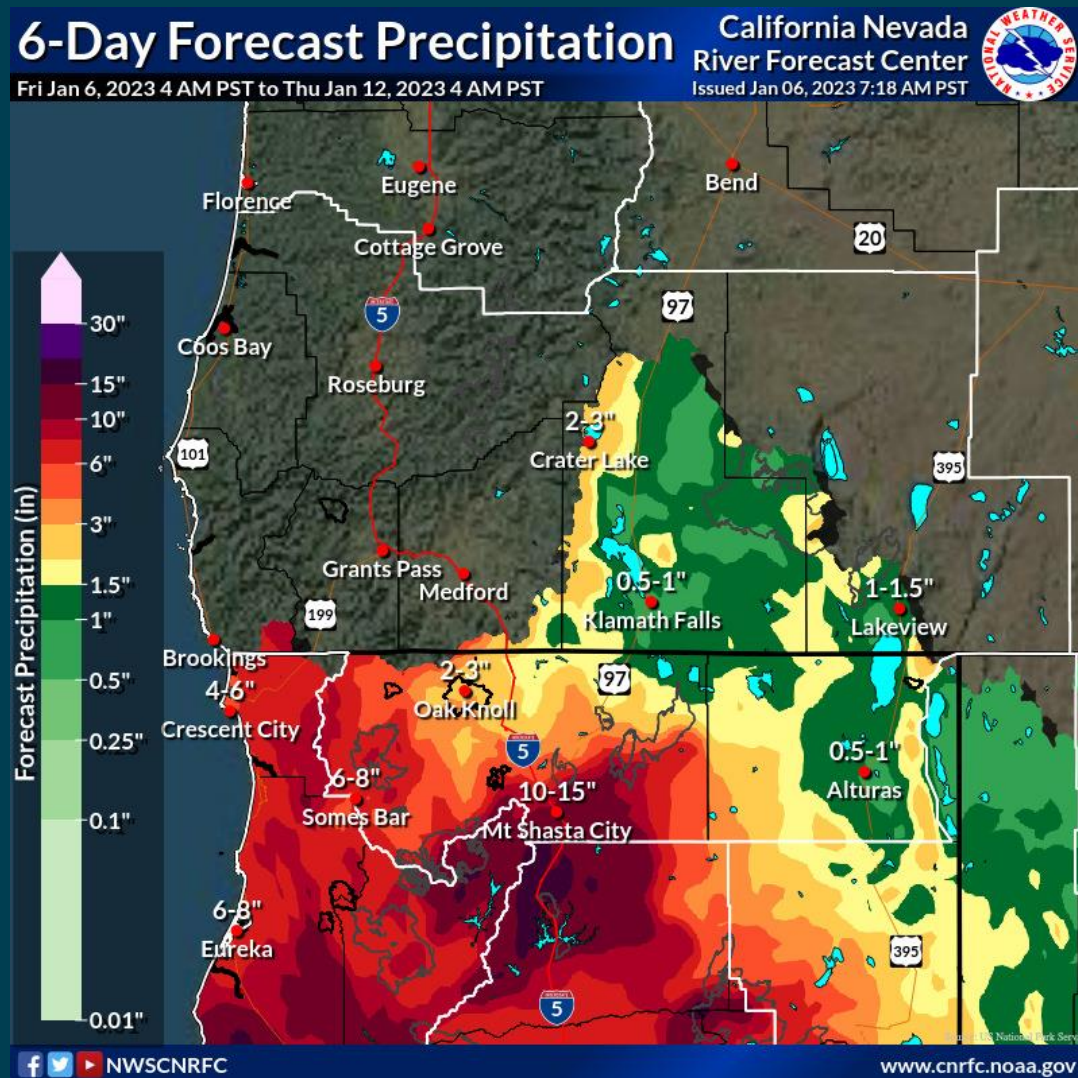
January 4, 2022



# Klamath Falls Airport Met Station - NWS

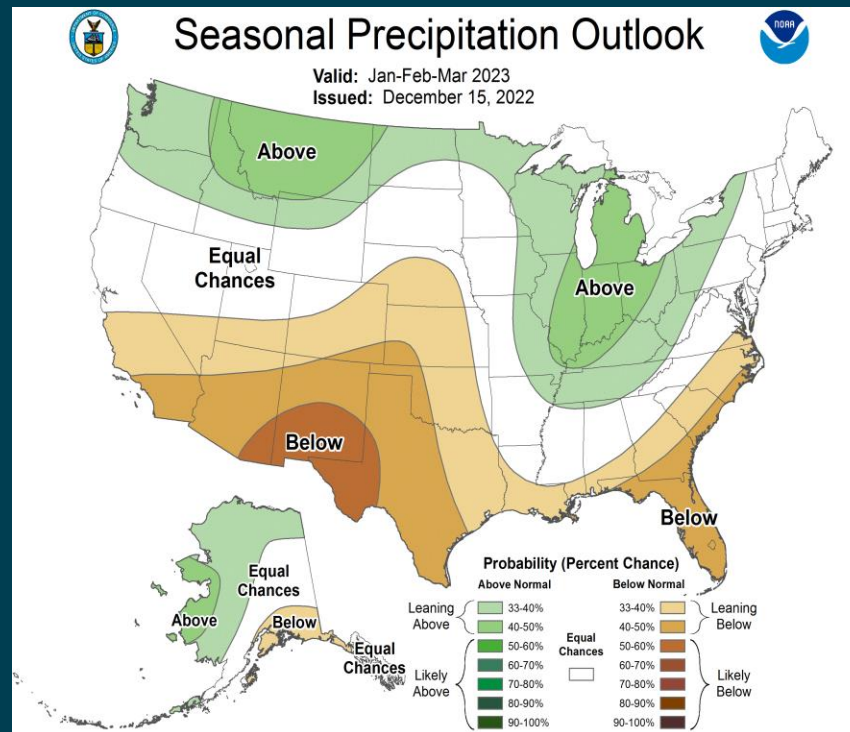
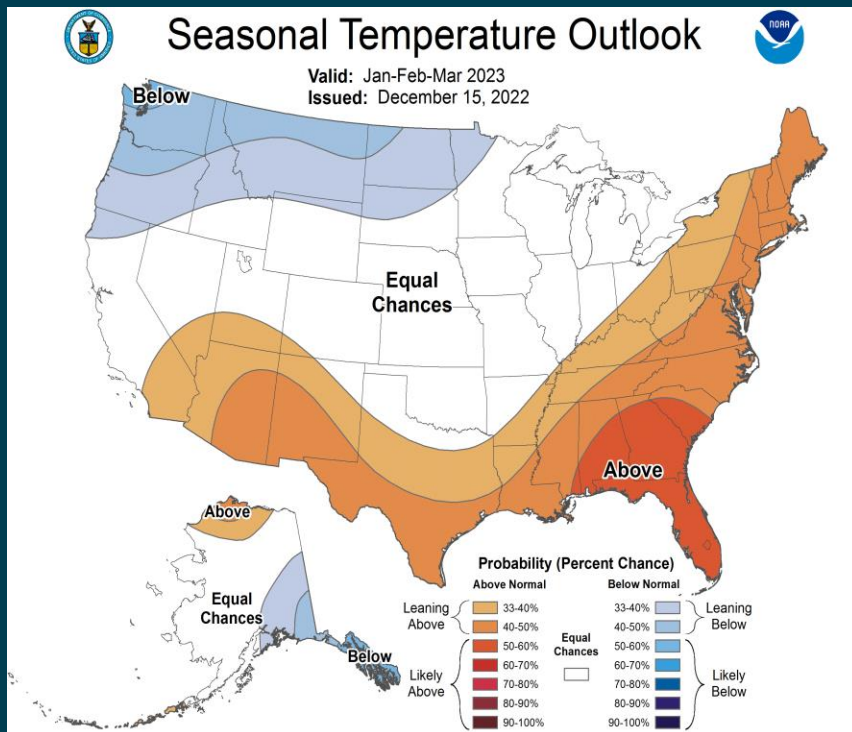


# 6-Day Precipitation Forecast – CNRFC Accumulated Total

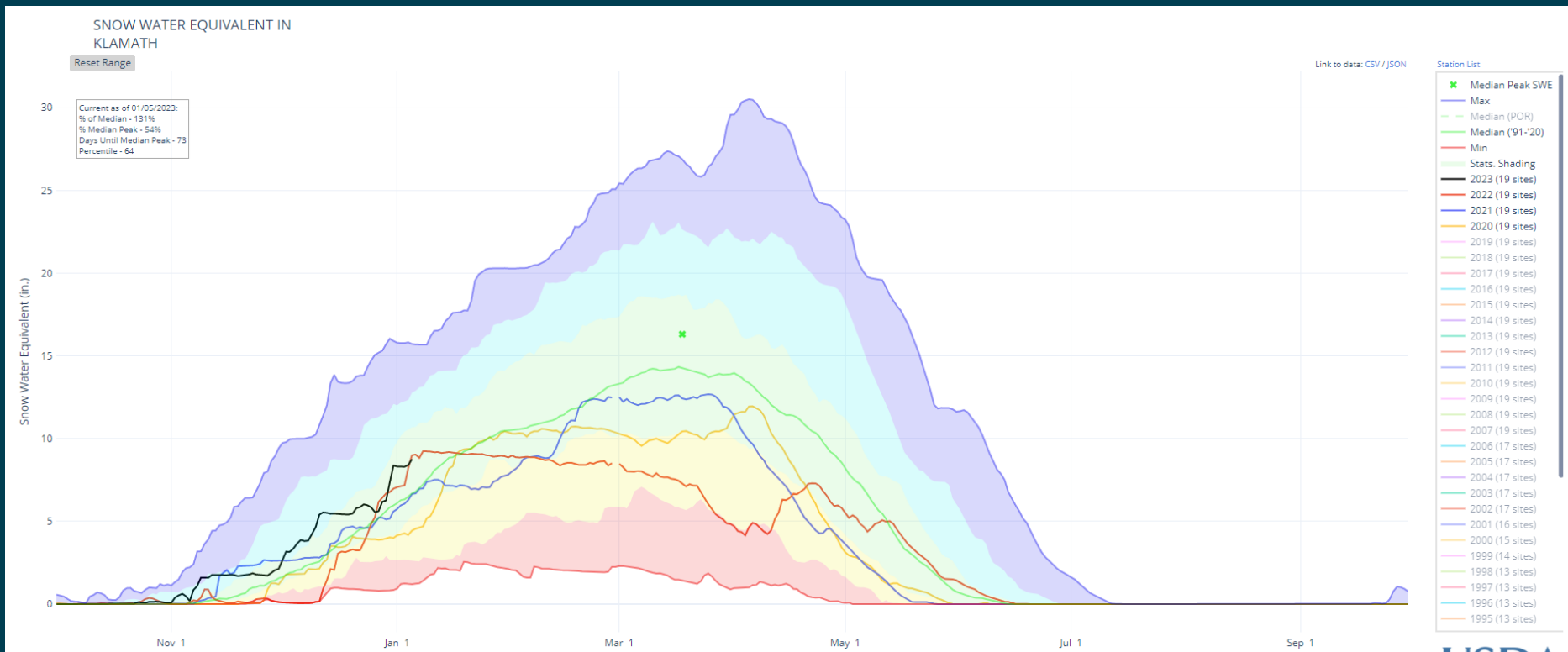




# January-March Weather Outlook

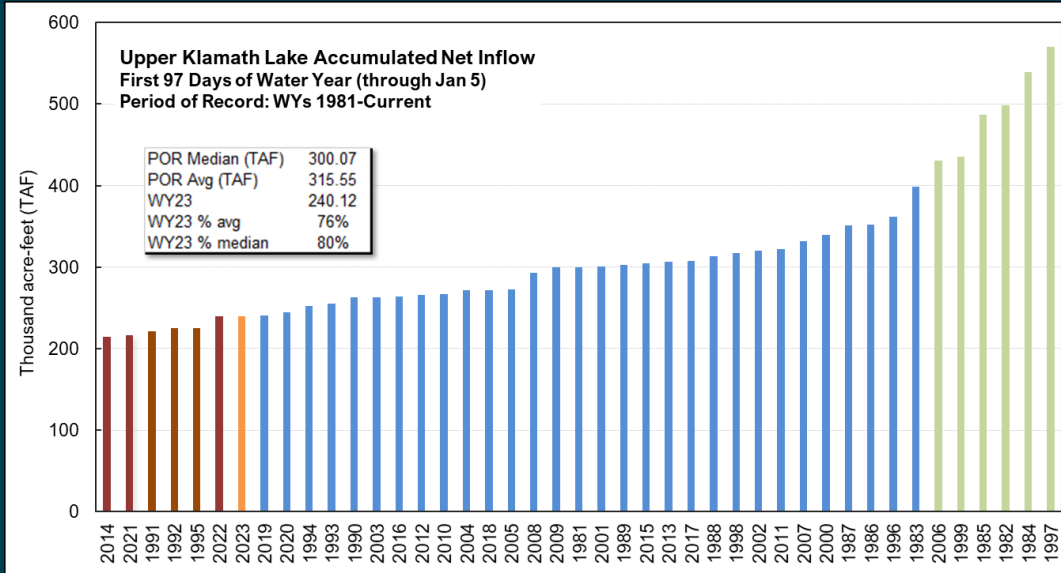


# NRCS Upper Klamath Basin Snow Water Equivalent (SWE) WY2023- NRCSWY2023 & Last 3 Water Years

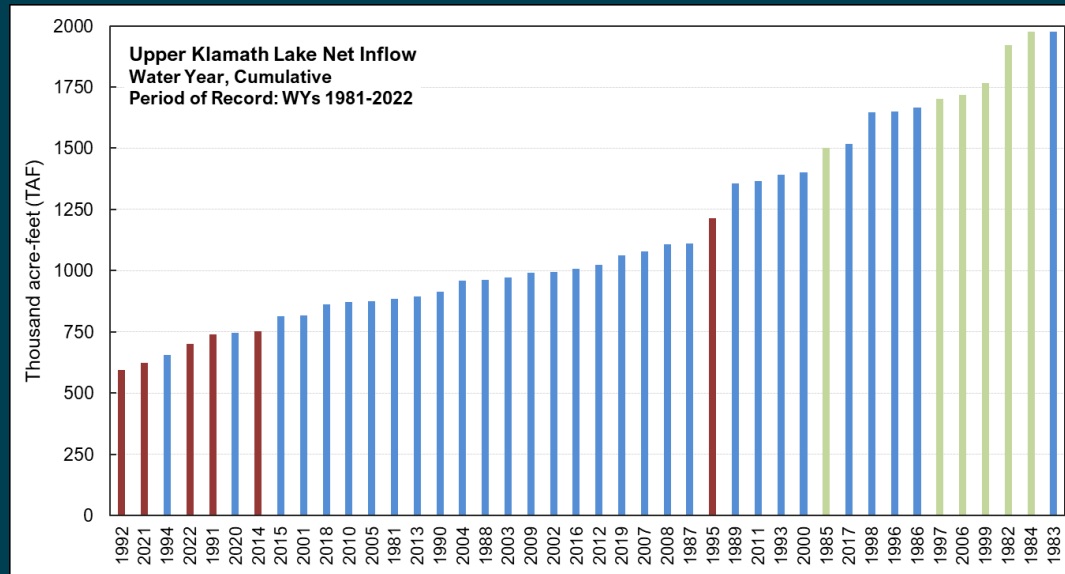




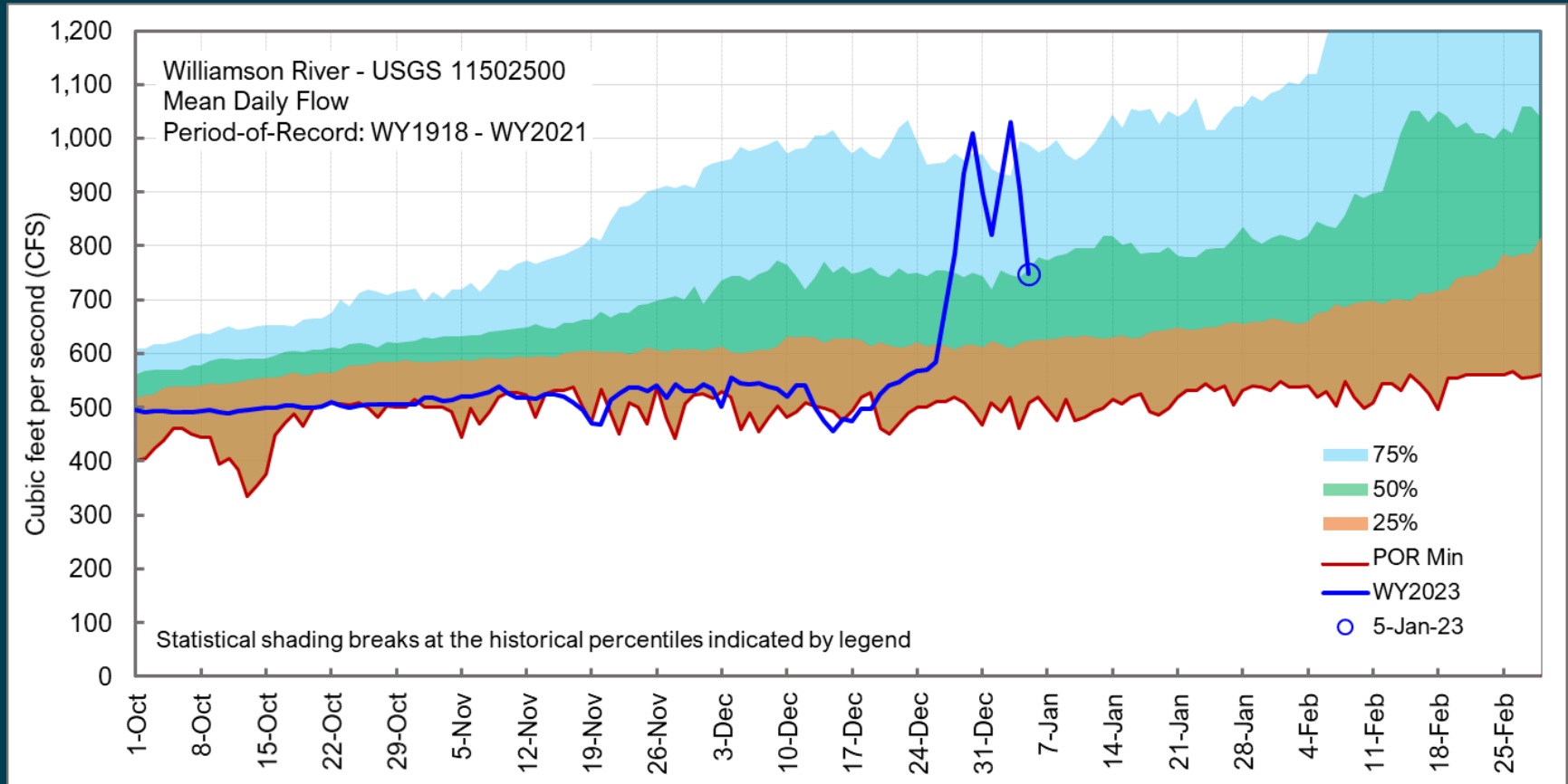
# UKL Cumulative Net Inflow WY2023 & Period-of-Record (POR)-to-Date



WY2022/2023 data are provisional and subject to revision



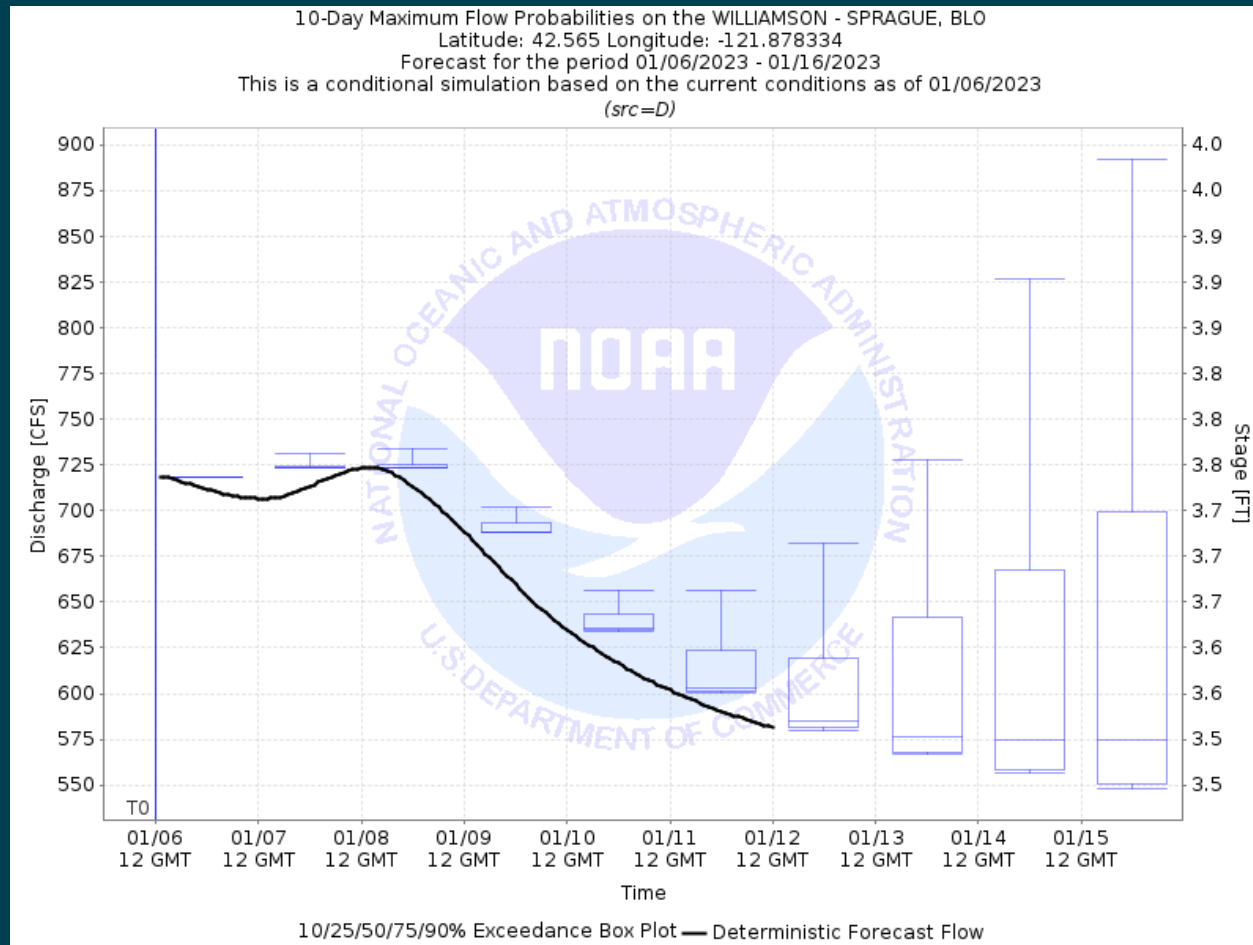
# Williamson River - USGS 11502500



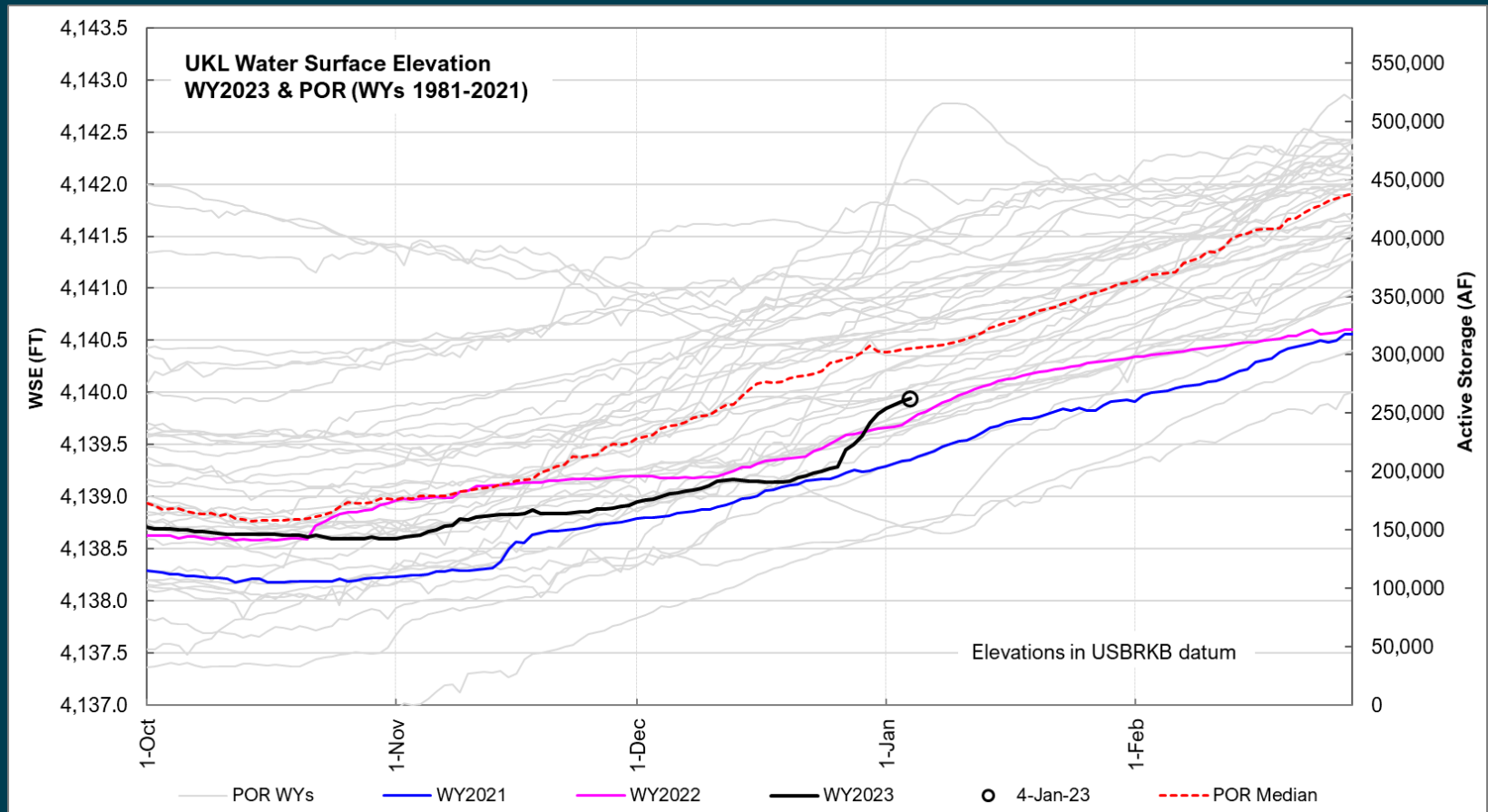
WY2022/2023 data are provisional and subject to revision



# Williamson River Forecast Expected to Return to Low Inflow Range over Next 10 Days (Lower 15 Percentile)



# UKL Water Surface Elevation WY2023 & POR-to-Date



WY2022/2023 UKL water surface elevation observational data are provisional

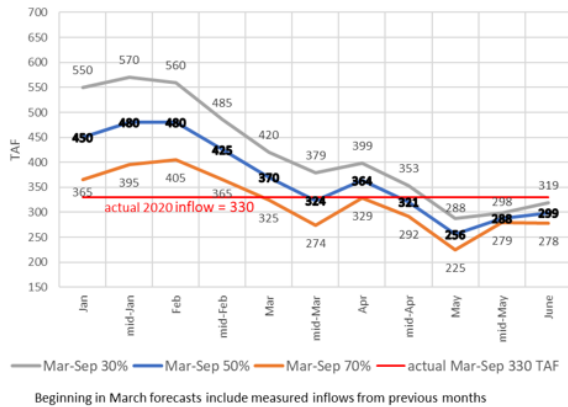


# Long-Term Upper Klamath Lake Inflow and Operations Forecasts

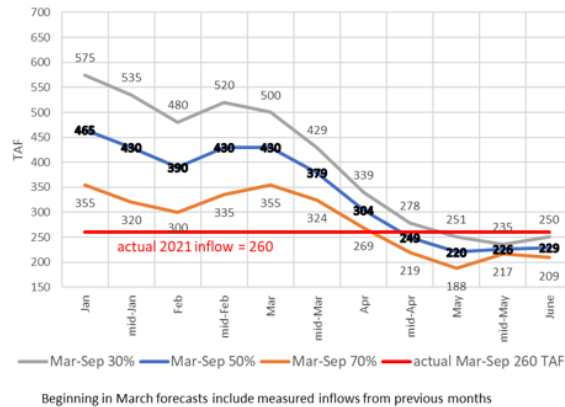


# NRCS Klamath River Basin Water Supply Forecast Last Three Water Years – March-September

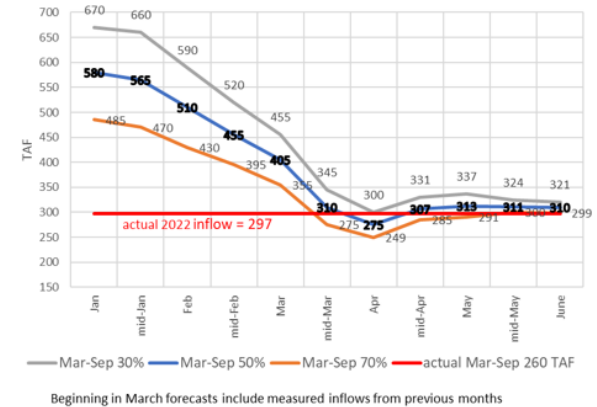
## 2020 NRCS Mar-Sep UKL Inflow Forecast



## 2021 NRCS Mar-Sep UKL Inflow Forecast

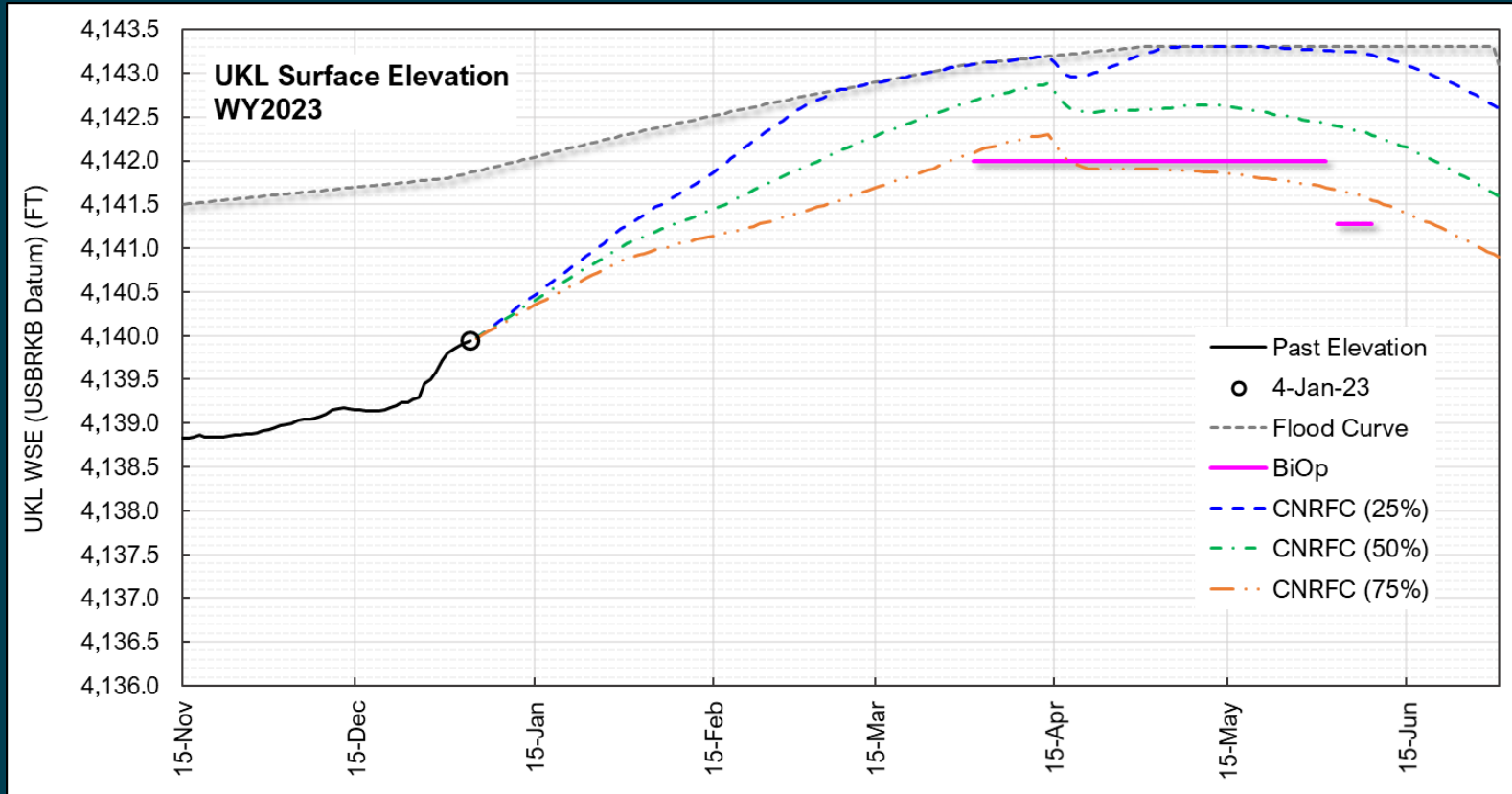


## 2022 NRCS Mar-Sep UKL Inflow Forecast





# UKL Water Surface Elevation – CNRFC UKLNI Forecast



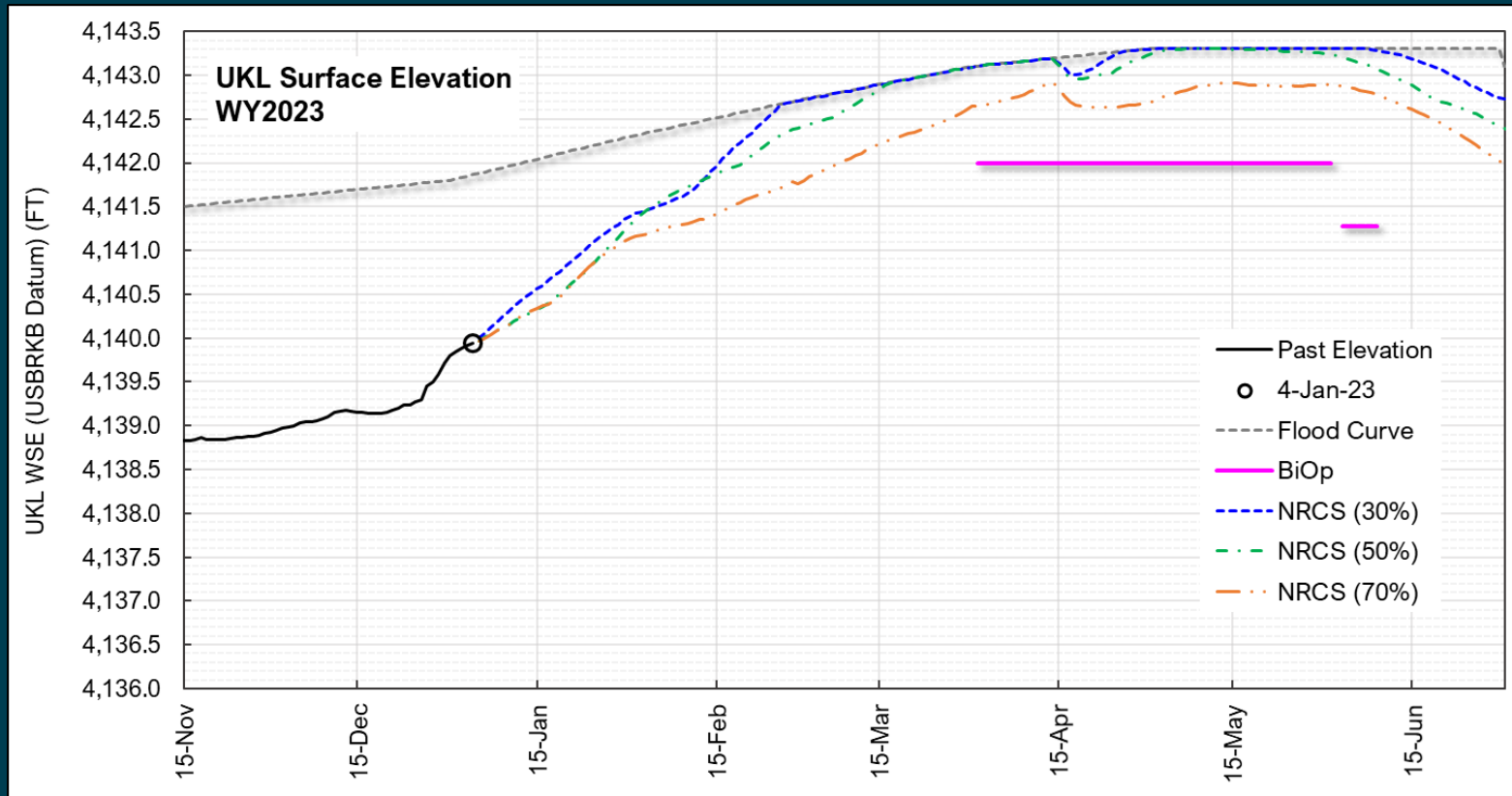
Projections, including WY2023 target elevations and surface elevation trajectories, are provisional and subject to revision based on future water supply forecasts, hydrologic conditions, and operational decisions

CNRFC UKL monthly probability net inflow forecast volumes at 25%, 50%, and 75% probability of exceedance (POE) levels used in ensemble

WY2023 observed UKL water surface elevation data are provisional



# UKL Water Surface Elevation – NRCS Jan 1 KRB WSF



Projections, including WY2023 target elevations and surface elevation trajectories, are provisional and subject to revision based on future water supply forecasts, hydrologic conditions, and operational decisions

NRCS Jan 1 KRB WSF UKLNI forecast volumes at 30%, 50%, and 70% probability of exceedance (POE) levels used in ensemble

WY2023 observed UKL water surface elevation data are provisional



# **DRAFT**

# **Temporary Operation Procedures**

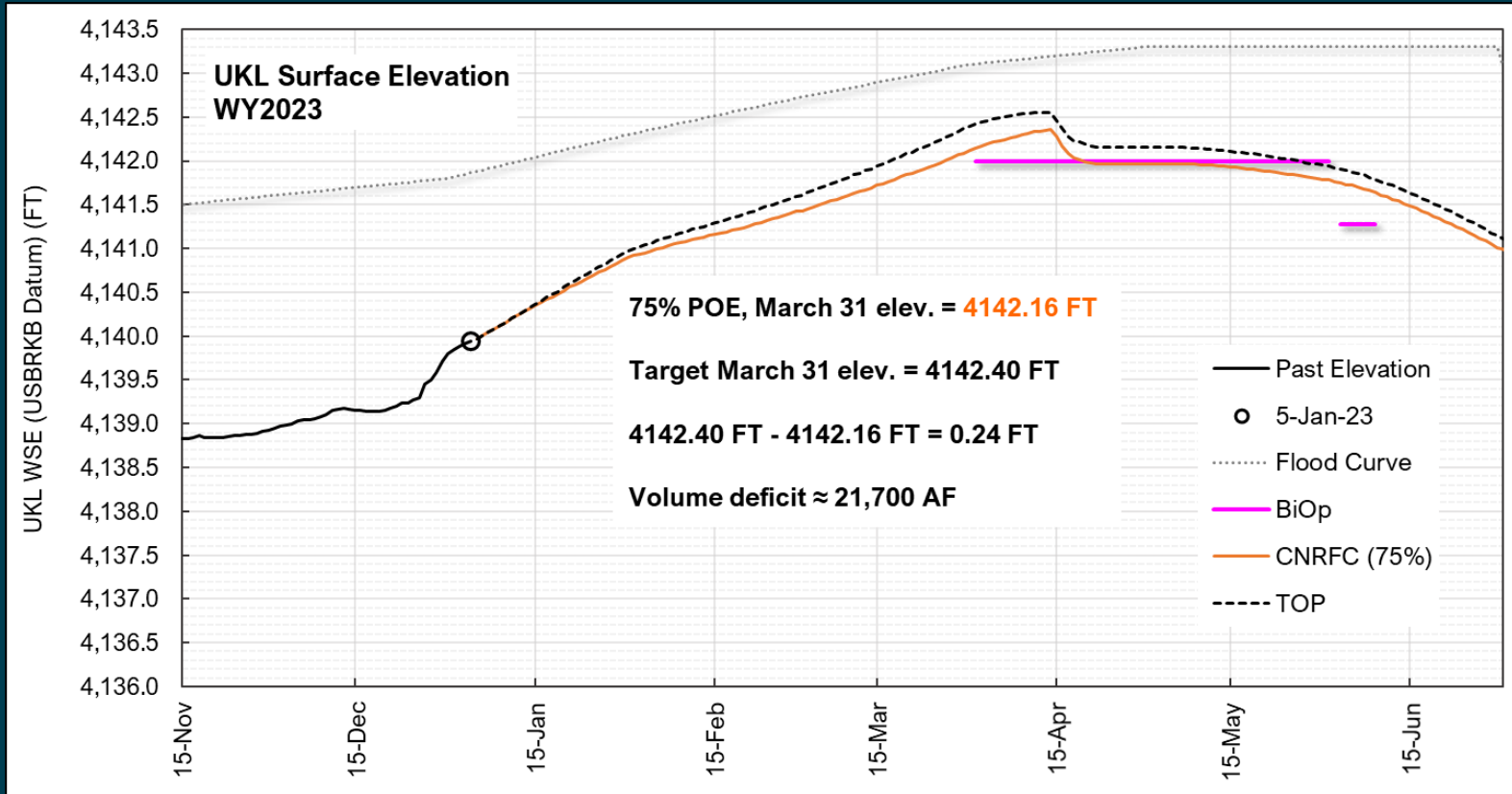


# Reclamation Assessment

- Without action, Reclamation plans to expect Upper Klamath Lake to be 15-30 TAF below our desired target elevation of 4,142.4 on April 1
- For planning purposes, Reclamation recommends that we plan for a deficit of approximately 22 TAF at this time



# UKL Water Surface Elevation – TOP with planned reductions



Projections, including WY2023 target elevations and surface elevation trajectories, are provisional and subject to revision based on future water supply forecasts, hydrologic conditions, and operational decisions

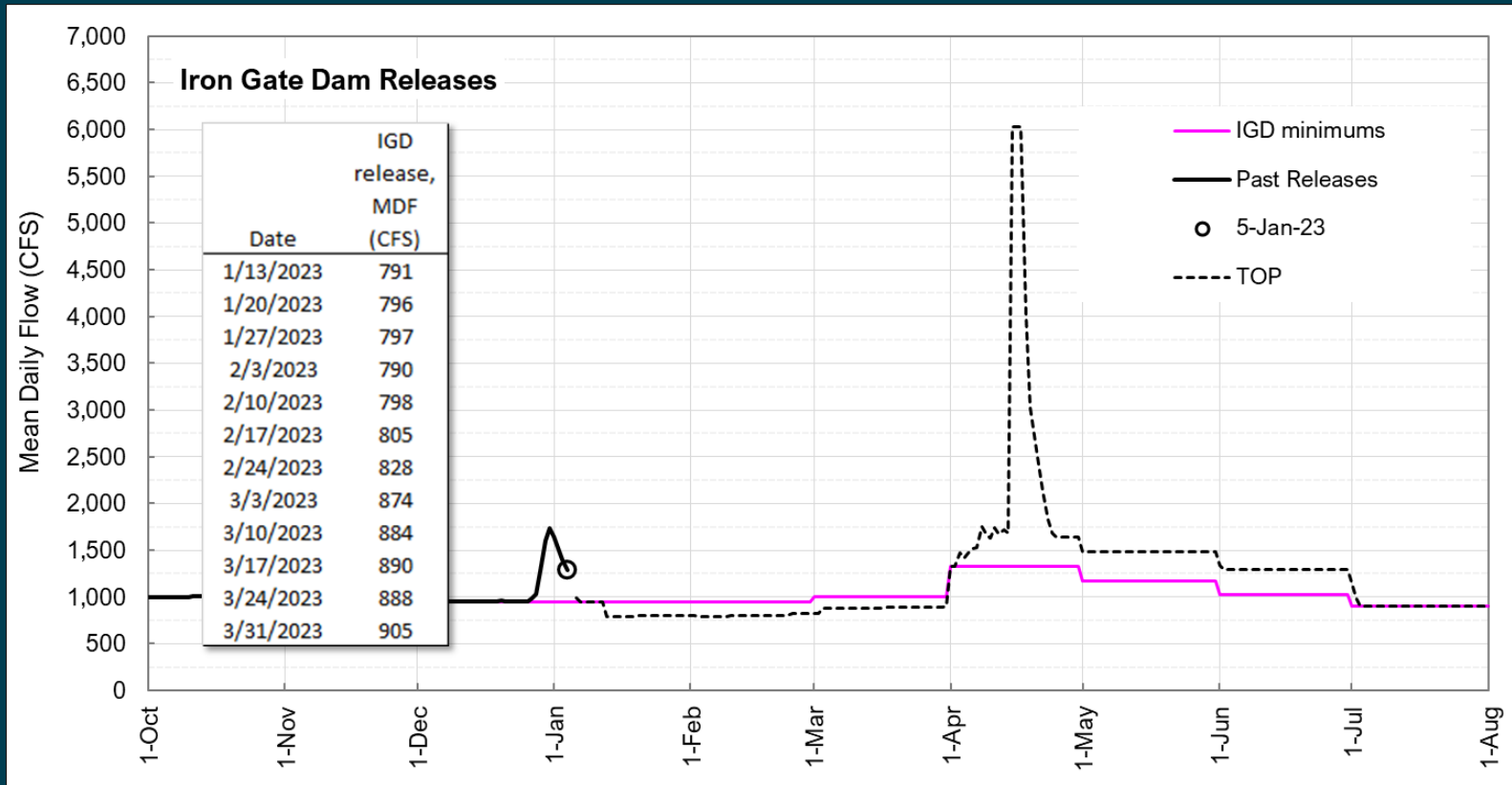
CNRFC 75% POE UKLNI forecast volume applied

WY2023 observed UKL water surface elevation data are provisional

Ag and Refuge diversions turned off throughout duration of reduction period (Jan 13 – Mar)



# UKL Water Surface Elevation – TOP with planned reductions



Projections, including WY2023 target elevations and surface elevation trajectories, are provisional and subject to revision based on future water supply forecasts, hydrologic conditions, and operational decisions

CNRFC 75% POE UKLNI forecast volume applied

WY2023 observed UKL water surface elevation data are provisional





# Proposed Schedule

Jan 6 (today)	FASTA presentation with DRAFT Temporary Operations Procedures
Jan 11 (Wed)	Technical Comments due to Reclamation on DRAFT TOP
Jan 13 (Fri)	Finalization of TOP



# Technical Input Requests

Reclamation is seeking input on the following technical topics:

- The stated objective of reaching 4,142.4 feet in Upper Klamath Lake by April 1, as a means of balancing risks to all ESA species
- The assessment of what the likely conditions on April 1 will be, based on available information
- The timing and magnitude of reductions to minimum flows that would minimize risks to salmon, as it relates to attaining 4,142.4 in Upper Klamath Lake by April 1



# Technical Input Requests

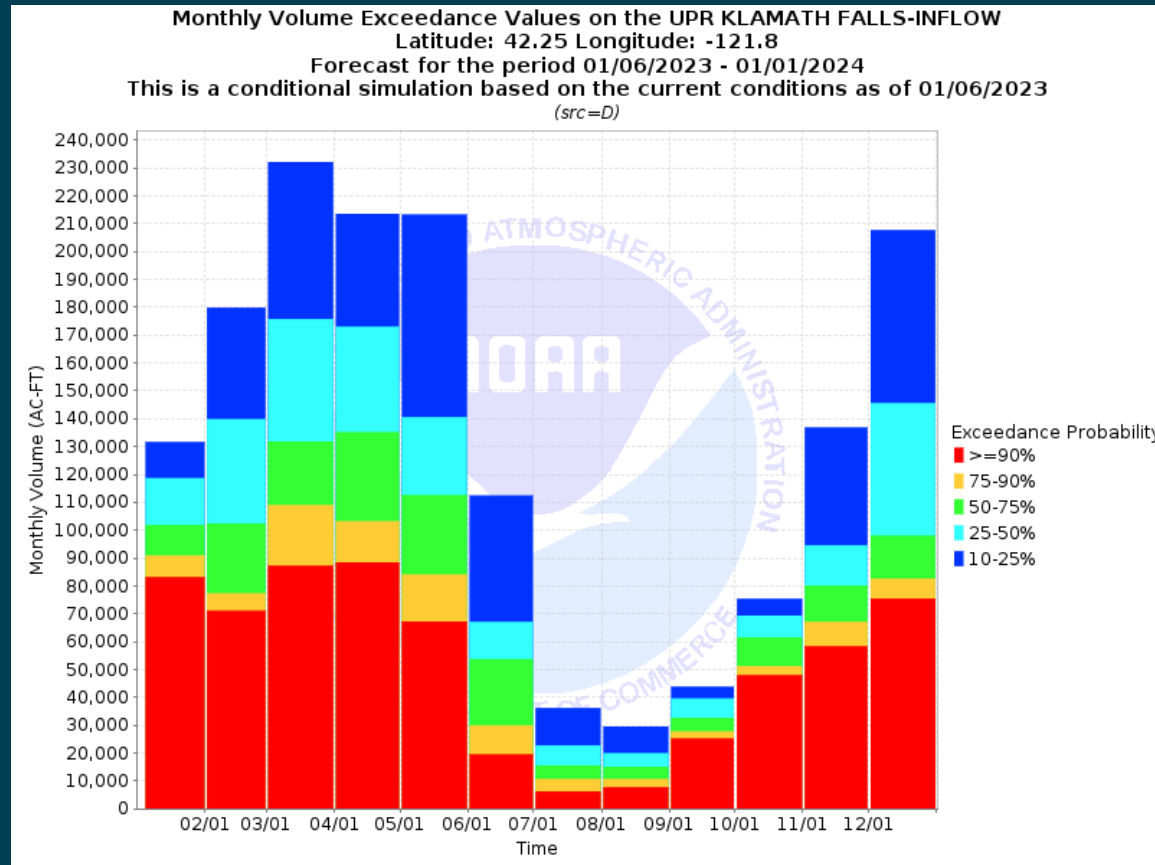
- Please submit comments, to Courtney Mathews, [cmathews@usbr.gov](mailto:cmathews@usbr.gov)
- Updates and materials can be found at [www.usbr.gov/mp/kbao](http://www.usbr.gov/mp/kbao)



# Supplemental Information



# Upper Klamath Lake (UKL) Net Inflow Forecast – CNRFC WY2023



Monthly Streamflow Volume (1000s of Acre-Feet)												
Data Updated: Jan 06 2023 at 9:45 AM PST												
Prob	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10%	161.5	179.9	232.2	213.6	213.2	112.2	36.1	29.5	43.7	75.3	136.8	207.7
25%	148.4	139.7	175.8	173.0	140.5	66.9	22.7	19.7	39.3	69.3	94.5	145.5
50%	131.7	102.4	131.9	135.1	112.5	53.5	15.4	15.0	32.5	61.5	80.0	97.9
75%	120.7	77.1	109.0	103.0	83.9	29.8	10.5	10.5	27.5	51.2	67.0	82.5
90%	113.0	70.9	87.2	88.4	67.2	19.4	6.2	7.6	25.1	47.8	58.2	75.4
Mean	136.3	136.1	171.9	152.0	124.5	62.0	22.8	25.3	46.5	72.9	97.6	124.9
%Mean	96.6	75.2	76.7	88.9	90.4	86.3	67.5	59.3	69.9	84.4	82.0	78.4



# NRCS Jan 1 Klamath River Basin (KRB) Water Supply Forecast (WSF)

USDA NRCS National Water & Climate Center

\* - DATA CURRENT AS OF: January 05, 2023 09:41:05 AM

- Based on January 01, 2023 forecast values

## KLAMATH RIVER BASIN

Forecast Point	period	50% (KAF)	% of med	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr med
Gerber Reservoir Inflow (2)	JAN-JUN	60	182	86	71	50	35	33
Sprague R nr Chiloquin	JAN-SEP	370	142	585	450	295	200	260
	MAR-SEP	280	130	465	350	215	140	215
Williamson R bl Sprague R nr Chiloquin	JAN-SEP	570	121	780	655	480	355	470
	MAR-SEP	435	121	620	510	360	250	360
Upper Klamath Lake Inflow (2)	JAN-SEP	900	119	1410	1050	765	505	755
	MAR-SEP	615	118	1030	735	505	305	520

Max (10%), 30%, 50%, 70% and Min (90%) chance that actual volume will exceed forecast.

Medians are for the 1991-2020 period.

All volumes are in thousands of acre-feet.

### footnotes:

1) Max and Min are 5% and 95% chance that actual volume will exceed forecast

2) streamflow is adjusted for upstream storage

Please see attached the streamflow forecasts in the Klamath Basin for January 1<sup>st</sup>. NRCS water supply forecasts for the Klamath, as in much of western North America where mountain snowpack acts as a massive reservoir, are driven primarily by snow water equivalent (SWE) data, and secondarily by other environmental parameters. Observed January 1, 2023 SWE was strongly above-normal in the Upper Klamath Basin (see map below). This reflects a combination of above-normal precipitation in the basin this water year to date, in large part due to a wet December and January; and cooler-than-normal winter temperatures so far such that the precipitation fell and accumulated as snow (see again maps below). This is partially offset by low antecedent streamflows in some upper Klamath reaches, which may reflect an anomalously dry and warm late summer and early autumn, giving dry initial conditions to the water year in terms of soil moisture levels and other natural water storages in the watershed.

The net outcome is, overall, a current best-estimate prediction of significantly above-normal spring-summer streamflow volumes, with some basin-to-basin variability. **Please note, however, that early-season forecasts like this January 1 prediction have comparatively low skill, as much of the winter-spring snowpack accumulation has yet to occur.** This forecast uncertainty is reflected in the comparatively wide prediction intervals (given as the stated 10%, 30%, 70%, and 90% exceedance flows in the attached file) around the best estimate.



# NRCS Upper Klamath Basin Snow/Precipitation Report WY2023

## Upper Klamath Basin SNOTEL Snow/Precipitation Update Report

Based on Mountain Data from NRCS SNOTEL Sites

\*\*Provisional data, subject to revision\*\*

Data based on the first reading of the day (typically 00:00) for Friday, January 06, 2023

Basin Site Name	Elev (ft)	Snow Water Equivalent			Water Year-to-Date Precipitation		
		Current (in)	Median (in)	Pct of Median	Current (in)	Median (in)	Pct of Median
KLAMATH							
Fish Lk.	4660	4.5	5.2	87	18.2	17.6	103
Chemult Alternate	4850	7.7	4.6	167	10.9	10.3	106
Gerber Reservoir	4890	2.1	1.2 <sub>(22)</sub>	175	6.9	5.6 <sub>(22)</sub>	123
Taylor Butte	5030	5.5	3.8	145	8.7	7.1	123
Crowder Flat	5170	3.8	1.7 <sub>(21)</sub>	224	7.1	5.3 <sub>(21)</sub>	134
Billie Creek Divide	5280	10.5	8.7	121	21.7	22.3	97
Diamond Lake	5280	4.7	6.6	71	18.3	20.2	91
Sun Pass	5400	12.4	8.0 <sub>(14)</sub>	155	16.6	17.0 <sub>(14)</sub>	98
Sevenmile Marsh	5700	14.9	10.6	141	26.5	26.7	99
Quartz Mountain	5720	3.2	0.9 <sub>(27)</sub>	356	8.6	5.4 <sub>(17)</sub>	159
Silver Creek	5740	7.5	4.3	174	10.5	9.6	109
Strawberry	5770	6.1	2.6	235	9.6	7.6	126
Cold Springs Camp	5940	11.3	11.6	97	16.0	24.1	66
Fourmile Lake	5970	12.4	10.8	115	21.7	23.9	91
Annie Springs	6010	20.1	15.6 <sub>(20)</sub>	129	25.9	28.8 <sub>(20)</sub>	90
Crazyman Flat	6180	11.4	7.5 <sub>(19)</sub>	152	12.4	12.4 <sub>(19)</sub>	100
Swan Lake Mtn	6830	16.2	8.6 <sub>(13)</sub>	188	18.4	14.5 <sub>(13)</sub>	127
Summer Rim	7080	7.2	7.0	103	8.6	9.3	92
Basin Index (%)		135			100		

-M = Missing data.

\* = Analysis may not provide a valid measure of conditions.

N/A = Not available.

Footnotes for median and average:

(##) = If less than 30 years are available, this value specifies the number of years used for the median and average calculations. Sites with less than 10 years available do not have medians or averages.

The MONTH-TO-DATE PRECIPITATION Percent of Median (or Average) represents the total precipitation (beginning on the 1st day of the current month) found at selected SNOTEL sites in or near the basin compared to the Median (or Average) value for those sites on this day.

The WATER YEAR-TO-DATE-PRECIPITATION represents total precipitation since October 1st, expressed in inches.

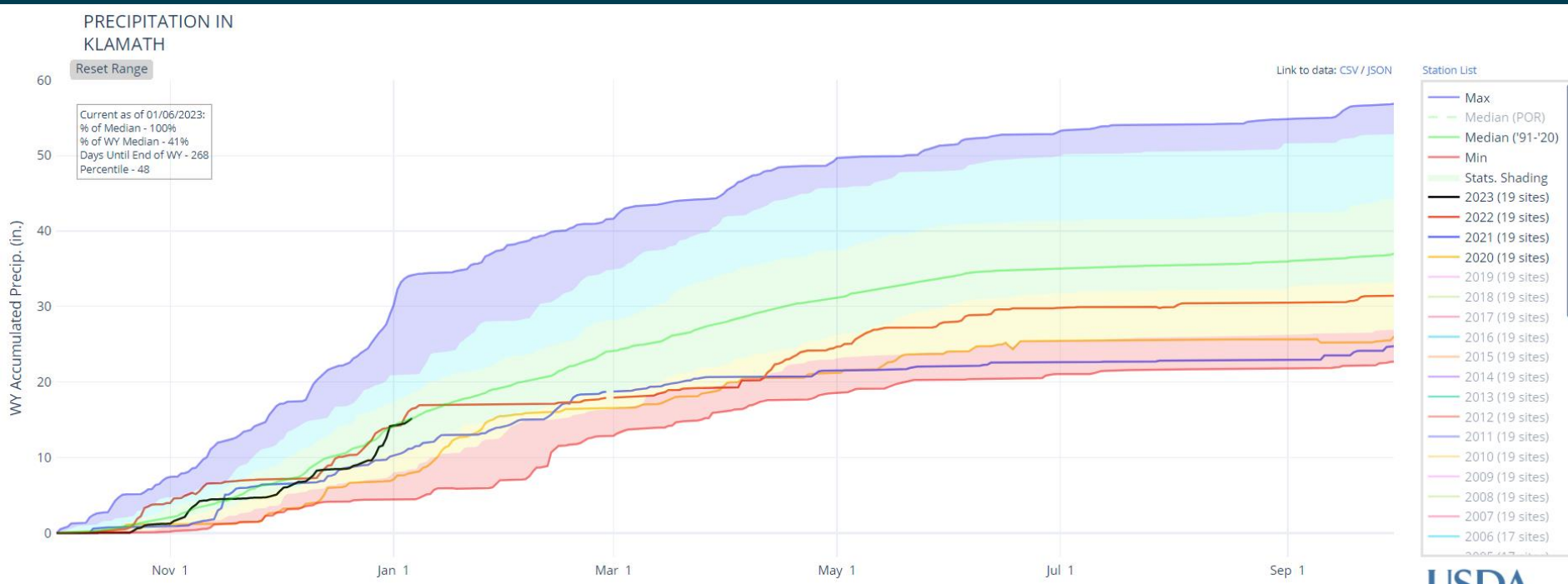
Contact your state water supply staff for assistance.

Medians and averages are calculated for the period 1991-2020.

Provisional data, subject to revision.



# Upper Klamath Basin Precipitation - NRCS WY2023



Statistical shading breaks at 10<sup>th</sup>, 30<sup>th</sup>, 50<sup>th</sup>, and 90<sup>th</sup> Percentiles  
WY2023 displayed as black trace



# Observed UKL Net Inflow December 30 – January 5

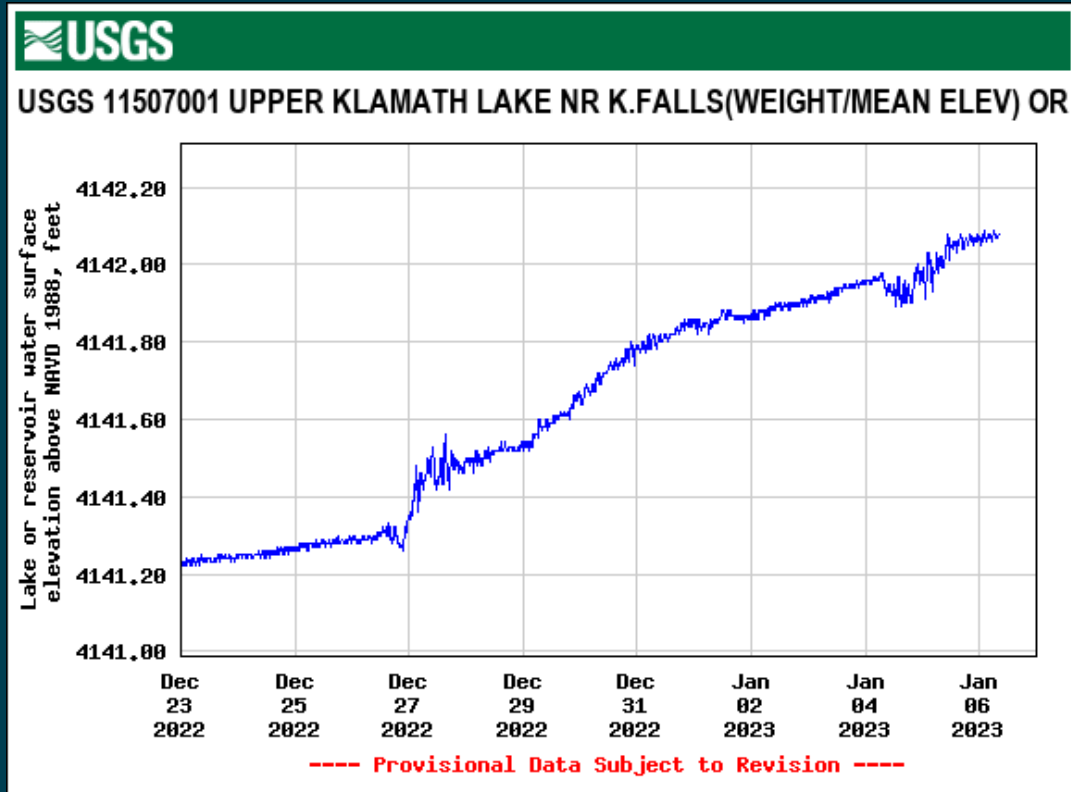
Date	Observed UKL Net Inflow (CFS)	Observed Percentile**
12/30/2022	5206	98%
12/31/2022	3721	90%
12/01/2022	2210	72%
1/2/2023	1454	24%
1/3/2023	1841	52%
1/4/2023	1137	2%
1/5/2023	3523	92%
Average	<b>2728*</b>	

\*Above date range: 86<sup>th</sup> POR percentile (14% exceedance) daily average = 2751 CFS

\*\*POR: WYs 1981-2021



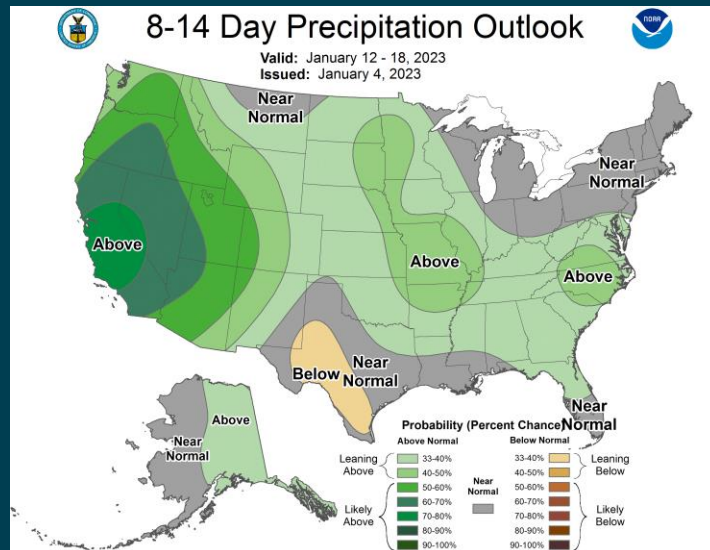
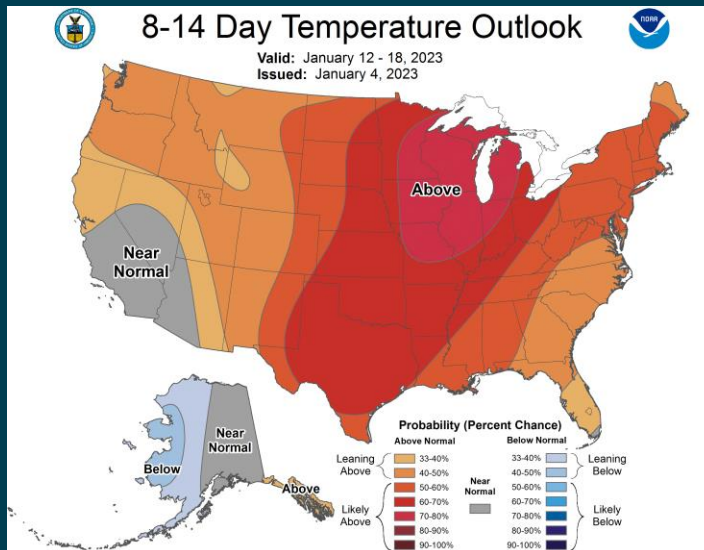
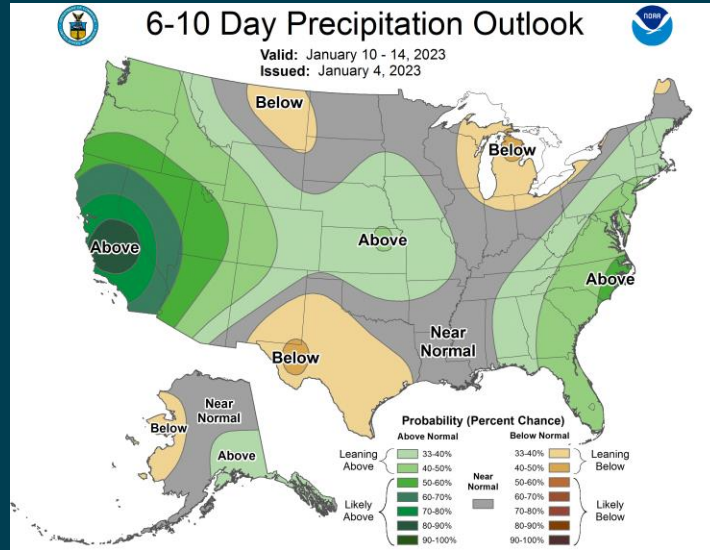
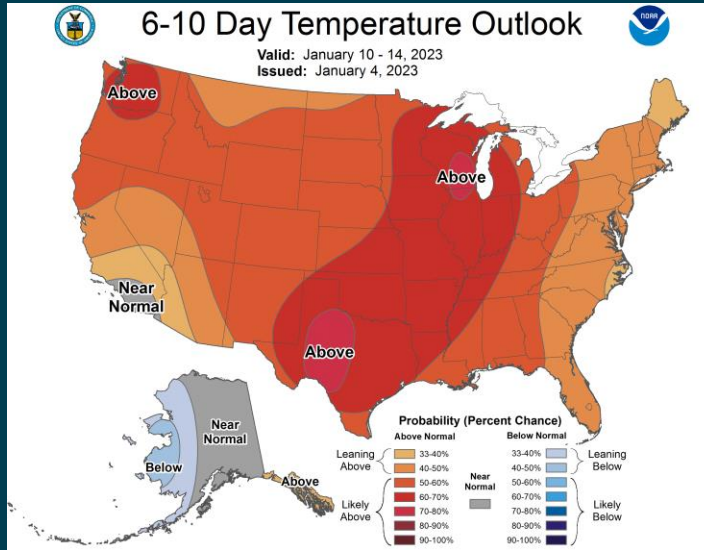
# UKL Water Surface Elevation December 23 – Present Day



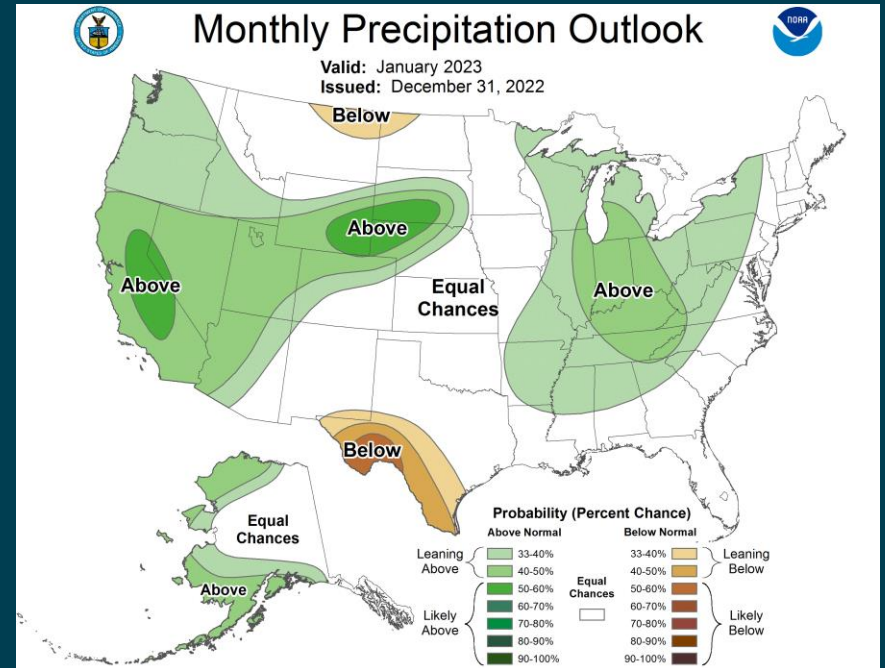
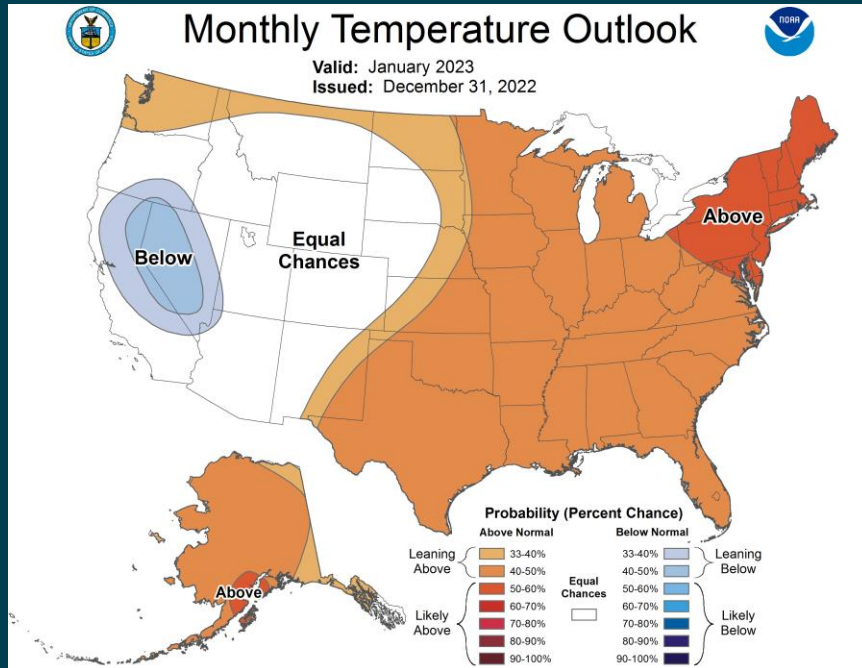
DATE	ELEVATION (FT)
12/23/2022	4139.23
12/24/2022	4139.24
12/25/2022	4139.27
12/26/2022	4139.29
12/27/2022	4139.45
12/28/2022	4139.50
12/29/2022	4139.58
12/30/2022	4139.71
12/31/2022	4139.80
1/01/2022	4139.85
1/2/2023	4139.88
1/3/2023	4139.92
1/4/2023	4139.94
1/5/2023	4140.02



# 6-10 & 8-14 Day Weather Outlook



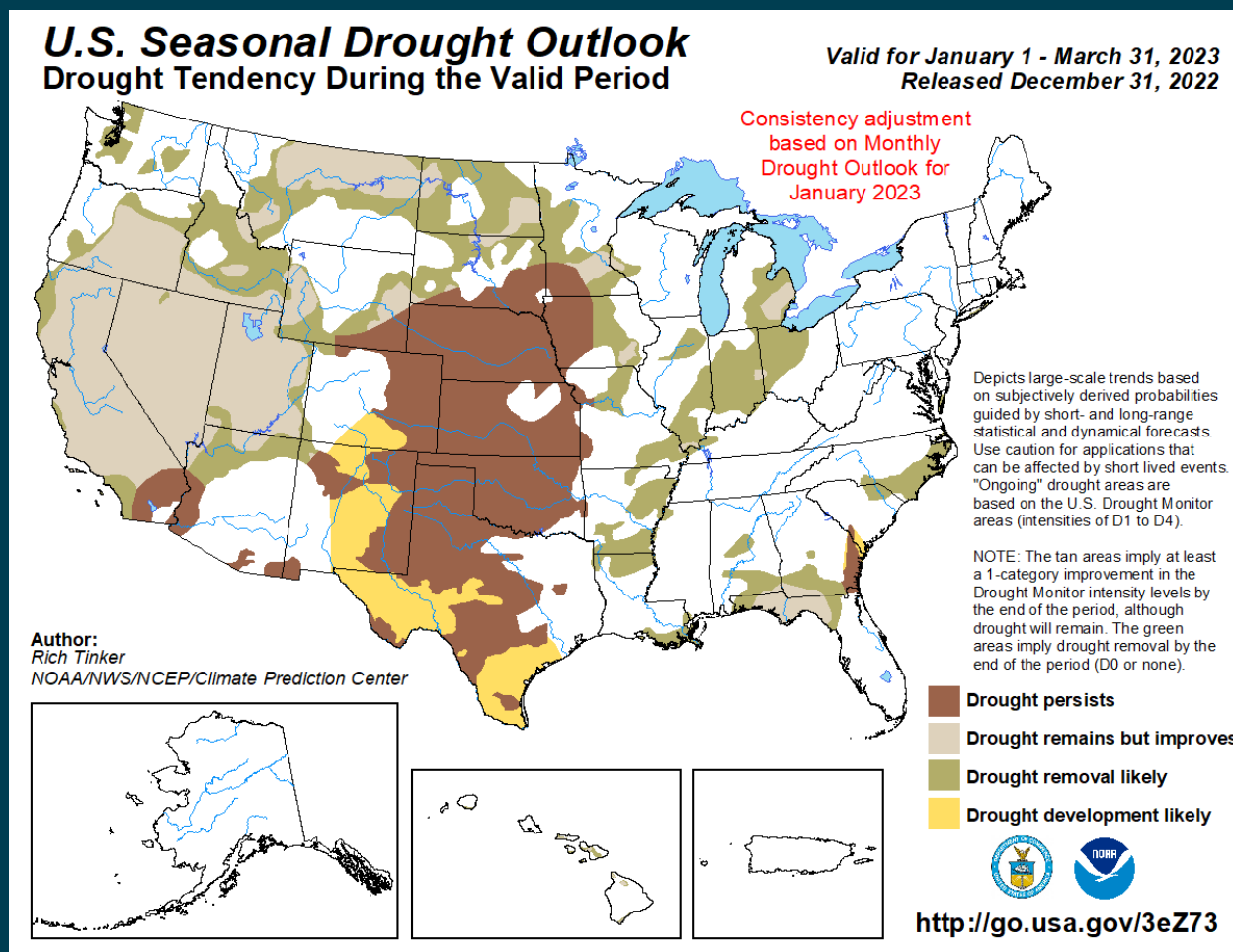
# January Weather Outlook





# U.S. Seasonal Drought Outlook

## January 1 – March 31, 2023



Next Seasonal Outlook issuance date: **January 19, 2023, at 8:30am EDT**

